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(56) Documents cited

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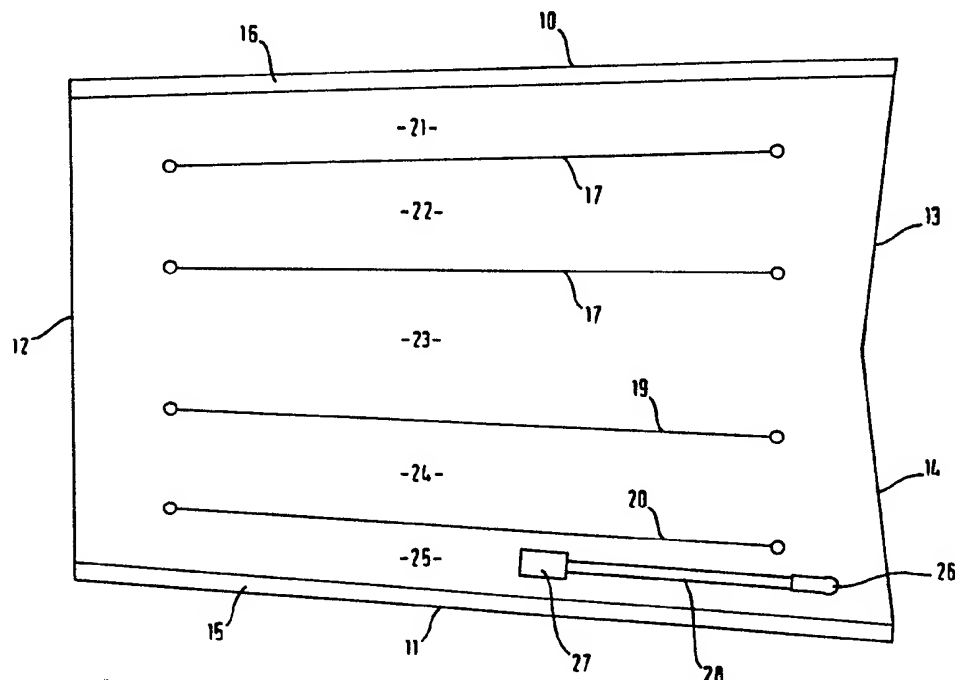
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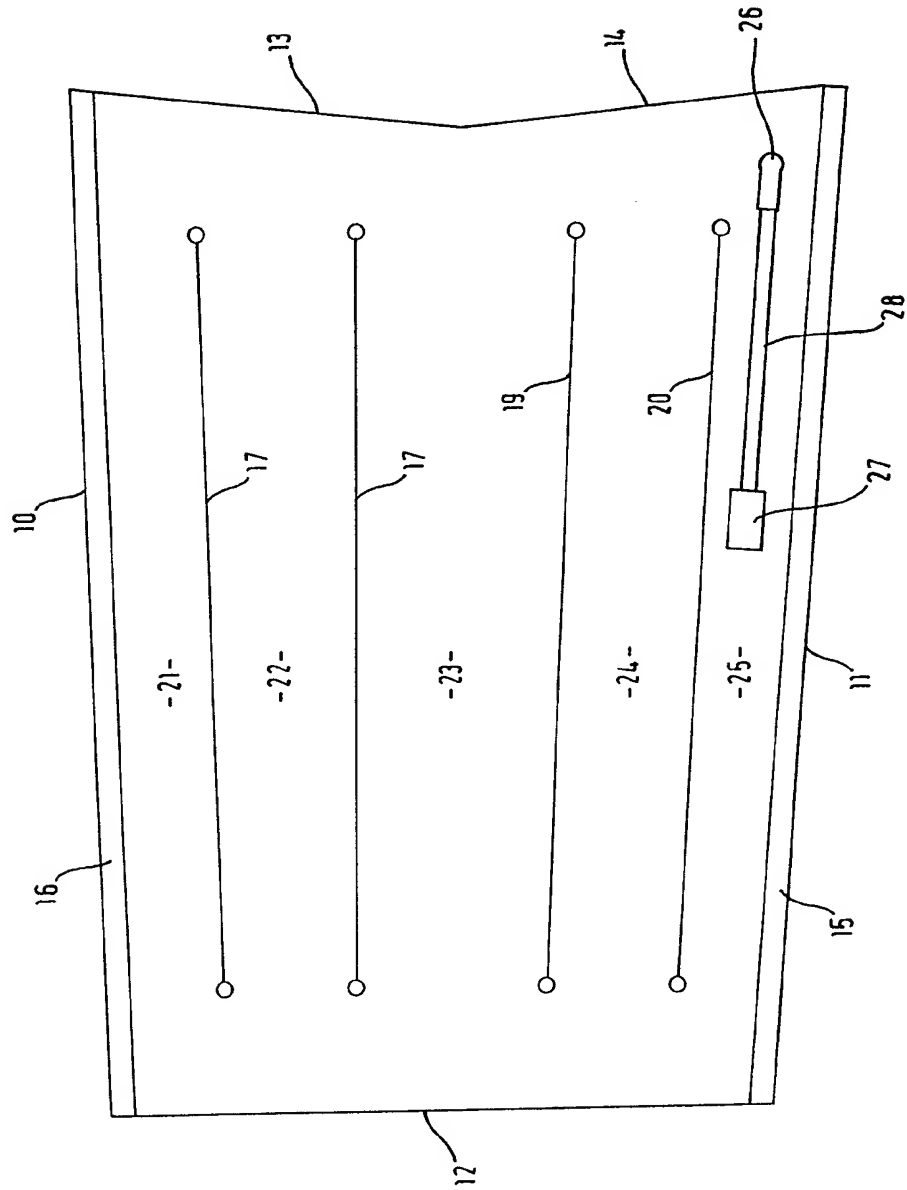
Selected US specifications from IPC sub-class A61F

(54) Inflatable bag for use as a splint

(57) A splint is formed from two layers of plastics sheet which are welded together at their peripheries (10-14) and along additional lines (17-20) inside their peripheries. The bag is placed around an injured limb and opposite marginal portions (15,16) are releasably fastened together to form a tube. The bag is then inflated.



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SPECIFICATION

Inflatable bag for use as a splint

5 The present invention relates to a method of forming a splint and to an inflatable bag for use in the method.

According to a first aspect of the invention, there is provided a method of forming a splint
10 wherein two layers of plastics sheet material are brought into face-to-face contact, said layers are welded together at their peripheries and at further positions within the peripheries of both layers to form a bag, a first margin of
15 the bag is releasably fastened to a second, opposite margin of the bag to form a tube and the bag is inflated.

The bag is preferably applied to a damaged limb prior to fastening of the margins of the
20 bag to each other to form the tube. When the bag is then inflated, one of the two layers of sheet material is brought into contact with the injured limb under sufficient pressure to support the limb. The tubular form of the bag
25 contributes substantially to the rigidity which is necessary to maintain the configuration of the limb.

According to a second aspect of the invention, there is provided a bag formed of plastics sheet material having fastening means for
30 releasably fastening a first margin of the bag to a second, opposite margin of the bag and an inlet for admitting air to the bag to inflate same, wherein the interior of said bag is at
35 least partly divided into a plurality of compartments.

In the preferred bag, the compartments are in mutual communication so that the compartments are inflated together.

40 Each compartment is preferably elongated, in which case the compartments are preferably arranged with their respective lengths extending in the same direction.

Each compartment may be tapered. The taper of at least one compartment is preferably
45 within the range 1 in 10 to 1 in 35 units.

The compartments may have respective different widths, the maximum width of one compartment exceeding the maximum width of
50 another compartment. The maximum width of the narrowest compartment may be less than the minimum width of another compartment. However, the maximum width of the narrowest compartment is preferably greater than the
55 minimum width of each other compartment.

There are preferably at least five elongated compartments arranged side by side with the widest compartment lying between two compartments of intermediate width and the two
60 narrowest compartments being remote from the widest compartment.

When the bag is flat, the divisions between adjacent compartments are preferably substantially rectilinear.

65 The bag, when flat, may be a quadrilateral

or a pentagon.

The fastening means preferably extends along substantially rectilinear margins of the bag and may be of a substantially continuous form, for example an adhesive tape, a zip fastener or the material sold under the designation "velcro". Fastening means of this form may extend along a part only of the corresponding margin of the bag, the fastening
70 means terminating a substantial distance short of an end of the bag.

The compartments are preferably in communication with each other adjacent to both of their respective ends.

80 An example of a bag embodying the invention will now be described, with reference to the accompanying drawing, which illustrates diagrammatically the bag in a flat condition.

The periphery of the bag shown in the accompanying drawing is a pentagon. The bag
85 has two, opposite margins 10 and 11 respectively, a margin 12 of intermediate length extending between the margins 10 and 11 at one end of the bag and two shorter margins 13 and 14 which collectively extend between the margins 10 and 11 at the opposite end of the bag. All of the margins 11 to 14 are, in the example illustrated, substantially rectilinear. The bag is formed of two layers of plastic
90 sheet material in face-to-face relation, the periphery of each layer coinciding with the margins 11 to 14.

Fastening means 15, 16 are provided along the margins 10 and 11 of the bag. These means are adapted to releasably fasten the margins 10 and 11 together to form from the bag a tube. The fastening means may be a slide fastener, for example a zip fastener. Alternatively, strips of the releasable sold under the designation "velcro" may be used. In a further alternative arrangement, the fastening
100 means 15, 16 may comprise one or more adhesive strips.

In the example illustrated, the fastening means 15, 16 extends along the entire lengths of the margins 10 and 11 of the bag. Alternatively, the fastening means may extend along a part only of each of these margins and may, for example, terminate a substantial distance short of the margins 13 and 14.
115

After the layers of plastic sheet material have been placed in face-to-face relation, they are welded together at the margins 11 to 14 and are also welded together along the lines
120 17 to 20 so that the interior of the bag is divided into five compartments, identified by the reference numbers 21 to 25. At each end of each line 17 to 20, the layers may be welded together around the periphery of a circle, as shown in the drawing.

125 It will be noted that each of the compartments 21 to 25 is somewhat tapered, the narrower end being adjacent to the margin 12. Typically, when the bag is flat, the taper of each compartment is within the range 1 in 15
130

to 1 in 35 units. The bag has a more pronounced taper, typically within the range 1 in 4 to 1 in 6.

Each of the compartments 21 to 25 is elongated and is arranged with its length extending generally longitudinally of the bag. Since the weld lines 17 to 20 are spaced substantially from the margin 12 and from the margins 13 and 14, the compartments communicate with each other at both of their respective ends. An air inlet 26 to the bag is provided near to the margin 14. As shown, a valve 27 may be connected with this inlet by a flexible tube 28 to facilitate inflation of the bag by exhaled air, or by a source of air under pressure. Preferably, there is used with the bag a low pressure source, to reduce the risk of inflation of the bag to an excessively high pressure.

When the bag is to be used as a splint, it is placed around a damaged limb, whilst in an uninflated condition, and the margins 10 and 11 are connected together by the fastening means 15, 16, to form a tube containing the limb. The bag is then inflated so that the inwardly presented surface of the tube engages the limb under moderate pressure to support the limb.

Upon inflation, each of the compartments 21 to 25 assumes an approximately cylindrical shape and the approximately cylindrical wall of the compartment acquires substantial rigidity. Inter-connection of the compartment walls to form a tubular structure further enhances rigidity of the splint so that this is able to maintain the configuration of the limb and to protect and support the limb.

It will be understood that the length of the bag is selected according to the length of the limb to be splinted and that length of each compartment is typically 10 centimetre less than the length of the bag. Each compartment has a length within the range 5 to 30 times the minimum width of that compartment. In the case illustrated, the minimum width is measured between the circular welds at the narrower end of the compartment.

The compartments have different widths, the wider compartment being the middle compartment 23 and the narrowest compartments being the marginal compartment 21 and 25. The intervening compartments 22 and 24 may be substantially identical with each other. The differences in width are not large, maximum width of the narrowest compartment typically being within 20% of the minimum width of the widest compartment. The maximum width of the widest compartment is preferably no more than 150% of the maximum width of the narrowest compartment.

In the example illustrated, the compartments 21 to 25 have substantially the same length. The bag may be modified by reducing the length of the weld lines 17 and 20 and extending the weld lines 18 and 19 towards the

margins 10 and 11. Such lateral extensions of the weld lines 18 and 19 may be provided only at those ends of the weld lines which are adjacent to the margins 13 and 14.

The features disclosed in the foregoing description, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately or any combination of such a features, be utilised for realising the invention in diverse forms thereof.

80 CLAIMS

1. A bag formed of plastics sheet material having fastening means for releasably fastening a first margin of the bag to a second, opposite margin of the bag and an inlet for admitting air to the bag to inflate same, wherein the interior of said bag is at least partly divided into a plurality of compartments.

2. A method of forming a splint wherein two layers of plastics sheet material are brought into face-to-face contact, said layers are welded together at their peripheries and at further positions within the peripheries of both layers to form a bag, a first margin of the bag is releasably fastened to a second, opposite margin of the bag to form a tube and the bag is inflated.

3. A method according to Claim 2 wherein, during inflation of the bag, compartments separated by welds at said further positions each assume an approximately cylindrical shape.

4. A bag according to Claim 1 wherein said compartments are in communication with each other.

5. A bag according to Claim 1 or Claim 4 wherein each compartment is elongated and at least some of the compartments are arranged with their respective lengths extending in the same direction.

6. A bag according to any one of Claims 1, 4 and 5 wherein each compartment is tapered.

7. A bag according to any one of Claims 1 and 4 to 6 defining compartments having respective different widths.

8. A bag according to Claim 7 wherein, when the bag is flat, the divisions between adjacent compartments are substantially rectilinear.

9. A bag according to Claim 1 comprising at least five elongated compartments arranged side by side with the widest compartment lying between two compartments of intermediate width and the two narrowest compartments being remote from the widest compartment.

10. A bag according to any one of Claims 1 and 4 to 9 wherein the fastening means extends along substantially rectilinear margins of the bag and is of a substantially continuous

form.

11. A bag according to Claim 10 wherein the fastening means extends along a part only of the corresponding margins of the bag.

5 12. A bag substantially as herein described with reference to the accompanying drawings.

13. Any novel feature or novel combination of features disclosed herein or in the accompanying drawing.

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